

The following paragraphs review the CD Radio Pioneer's Preference filings in chronological order.

1. Initial Pioneer's Preference Filing, May 1990

In its initial filing with the Commission CD Radio requested a Pioneer's Preference.³⁴ In this document CD Radio discussed several ways the Commission could economically reward CD Radio in the licensing process. No technology development or innovation is claimed. It should be noted that the idea of satellite radio was not invented by CD Radio (see Section 1, above).

2. Request for Pioneer's Preference, July 1991

In July 1991 CD Radio filed its first formal request for a Pioneer's preference. The justification for this request is contained in a section entitled "Detailed Pioneer's Preference Justifications."³⁵ Nowhere in this section, or for that matter the entire filing is there any description of CD Radio technology development or innovation. CD Radio simply states:

"The services to be provided by CDR are new, unique, desirable and in the public interest. CDR is pioneering a new combination of advanced technology in spectrum that would be used for the first time for these novel services."³⁶

No information is provided to support a claim that CD Radio contributed or played a role in developing any of the base technology - they simply combined existing technology.

³⁴ Application of CD Radio, Inc. For an All Digital CD Quality Satellite Sound Broadcasting System, May, 18, 1990, pages 39-41.

³⁵ Request for Pioneer's Preference, July 30, 1991, pages 3-9.

³⁶ Ibid, page 3.

Further, CD Radio attaches three Exhibits to its July 1991 filing and cites their content in support of their claim to a Pioneer's Preference.³⁷ These Exhibits are a study of S-band satellite propagation prepared by the Indian government (Exhibit 1), a service economic viability study (Exhibit 2), and review of possible satellite/terrestrial frequency sharing (Exhibit 3). These exhibits clearly do not show any hint of technology development or innovation.

3. Supplemental Pioneer's Preference Filing, January 1992

In January 1992 CD filed a supplement to its Pioneer's Preference Request in which it calls attention to its Fixed Location Tests (also referred to as the Early Bird Experiment) as grounds for issuance of a Pioneer's Preference. The results of these tests are analyzed in Section 4, above. CD Radio goes on to call attention to its pioneering efforts on behalf of satellite radio by enumerating changes they have made to what they call their "techno-regulatory design." CD Radio then states:

The most significant modifications are operation in the 2310-2360 MHz band, subscription service mode, ample multiple entry, and a commitment to serve all 50 states.³⁸

Clearly, the move to S-band, the decision to be subscription based and the expansion to serve all 50 states are not technical issues. The only technical issue is the CD Radio multiple entry scheme. This scheme is based on frequency sharing using cross polarization isolation, a technology rejected by the Commission as unproven in the mobile environment.

4. Supplemental Pioneer's Preference Filing, June 1993

³⁷ Ibid, Summary section, unnumbered page.

³⁸ Ibid, page 6.

CD Radio heavily relies on its claim to have developed frequency and spatial diversity to justify its claim to a Pioneer's Preference. This claim is flawed on several points: First, CD Radio did not invent frequency and spatial diversity, it merely applied prior art to its system design; second, in its latest system redesign³⁹ it has totally abandoned frequency diversity, and third, analysis shows that space diversity provides little in the way of system performance improvement.

In its technical filings with the Commission CD Radio fails to provide any analysis to support its claims that spatial diversity truly enhances system performance. Rather, CD Radio totally relies on sparse empirical field data gathered in a limited, tightly controlled and non-representative environment to support its claims. The Federal government, through the joint efforts of NASA, JPL and Voice of America, has sponsored a significant multi-year effort to collect data on satellite signal performance in the mobile environment. Extensive signal propagation measurements were performed all across the United States; in cities, suburban areas, along rural roads and the interstate highways. This has resulted in the publication of a wealth of signal propagation data rigourously collected in the field using actual geostationary satellites operating in S-band or closely related bands. It is indeed odd that CD Radio does not support its technical claims with any reference to this data.

Primosphere has taken the signal propagation data collected by NASA/JPL/VOA and performed an extensive computer based analysis. This analysis focused on the efficacy of spatial diversity as a tool to mitigate signal fading and blockage in the mobile environment. Primosphere took as its base line a state of the art satellite signal using forward error correction coding, block coding, and interleaving resulting in a 7 dB clear unobstructed line of sight link margin. A single satellite system operating at 95° W longitude was compared with a two satellite system operating at 80° and 110° W

³⁹ Letter from Robert Briskman, CD Radio, to William Caton, FCC, March 22, 1996.

longitude. A computer model of blockages in the suburban and urban zones was built using the NASA/JPL/VOA data and applied to fourteen cities across the United States. The analysis used mean time between audible outages as its performance measure.

The results of Primosphere's analysis are plotted for suburban and outer urban zones and are shown in Figure 1 and 2 attached to this document. The analysis shows that in the suburban environment a mobile listener would encounter an audible outage approximately once per minute with a single satellite and approximately once every two minutes with spatial diversity. This is hardly the kind of performance a listener expects from a premium radio service.

Thus, CD Radio's claims for spatial diversity are false and based on faulty experiments. Spatial diversity helps, but it is not the key to mitigating the effects of fading and signal blockage. CD Radio has failed to show that use of spatial diversity results in a robust satellite radio service.

5. Supplemental Pioneer's Preference Filing, September 1995

This filing contains a summary of all CD Radio technical innovations in an attachment titled "Summary of Experimental Results." This analysis clearly shows that all of the experiments performed by CD Radio, and referenced in support of their Pioneer's Preference, either confirm prior art or are flawed. In no case does the record substantiate CD Radio claims to having developed technology making satellite radio technically or economically more viable.

CD Radio has not justified, and should not be awarded, a pioneer's preference for a nationwide license. If CD Radio has innovations of true merit, the financial community will value those innovations by providing the necessary support to CD Radio's participation in a competitive bidding process, if one is implemented.

III. DSBC Has Not Met the Commission's Requirements for a Pioneer's Preference

DSBC's request for a pioneer's preference also must be denied. DSBC seeks a preference for a system design that does not fall within the definition of a nationwide satellite digital audio radio system. DSBC has proposed a terrestrial radio system, with supplementary satellite spot beams over major metropolitan areas. This is not the nationwide service to unserved areas of the United States envisioned by the Commission in its Notice of Proposed Rulemaking.⁴⁰ It is questionable as to whether the Commission will even permit the extensive system of terrestrial transmitters proposed by DSBC. The Commission in the Notice, expresses concern that "[N]one of the satellite DARS applicants, however, provided the necessary technical information in their applications to demonstrate how these complementary terrestrial repeater networks would be implemented." Consequently, the Commission does not propose rules to govern terrestrial "gap-fillers" in its Notice, but rather seeks comment on the issue of whether the service at some point would become essentially a terrestrial rather than a satellite service.⁴¹ Thus, the Commission proposes to prohibit the operation of terrestrial transmitters, an essential part of the DSBC system design. DSBC thus will be unable to implement the system on which its claim of preference is based, and cannot claim that the rules adopted for satellite digital audio radio service are an outgrowth of its proposals.

With regard to the technical aspects of DSBC's pioneer preference request, its proposal similarly suffers from the infirmities attributed to the CD Radio proposal. That is, DSBC's proposal relies on existing satellite communications technology and cannot be said to be innovative. The use of spot beams, audio compression and CDM modulation have a long history of use within satellite systems. DSBC has nowhere demonstrated that

⁴⁰ See, Notice of Proposed Rulemaking, IB Docket No. 95-91, FCC 95-229, at para.43.

⁴¹ *Supra*, at paras. 55 and 56.

it has pioneered any of this technology but rather has assembled in its system design technology developed and proven by others.

Primosphere notes that DSBC also has opposed the use of a pioneer's preference in this proceeding. DSBC, in a letter to the Commission dated June 2, 1993, states that "[T]he dynamic nature of the satellite industry render it virtually impossible to determine what is an "innovative" development.⁴²

⁴² Letter of W. Theodore Pierson, Jr. and Douglas J. Minster to Ms. Donna Searcy, Secretary, Federal Communications Commission, dated June 2, 1993.

IV. CONCLUSION

Primosphere has demonstrated conclusively that no pioneer's preference should be awarded in this proceeding. The public interest would not be served by such an award and no applicant has fulfilled the Commission's requirements for a preference. The Commission should proceed to adopt license and service rules for satellite DARS and to prompt licensing of the applicants.

Respectfully submitted,

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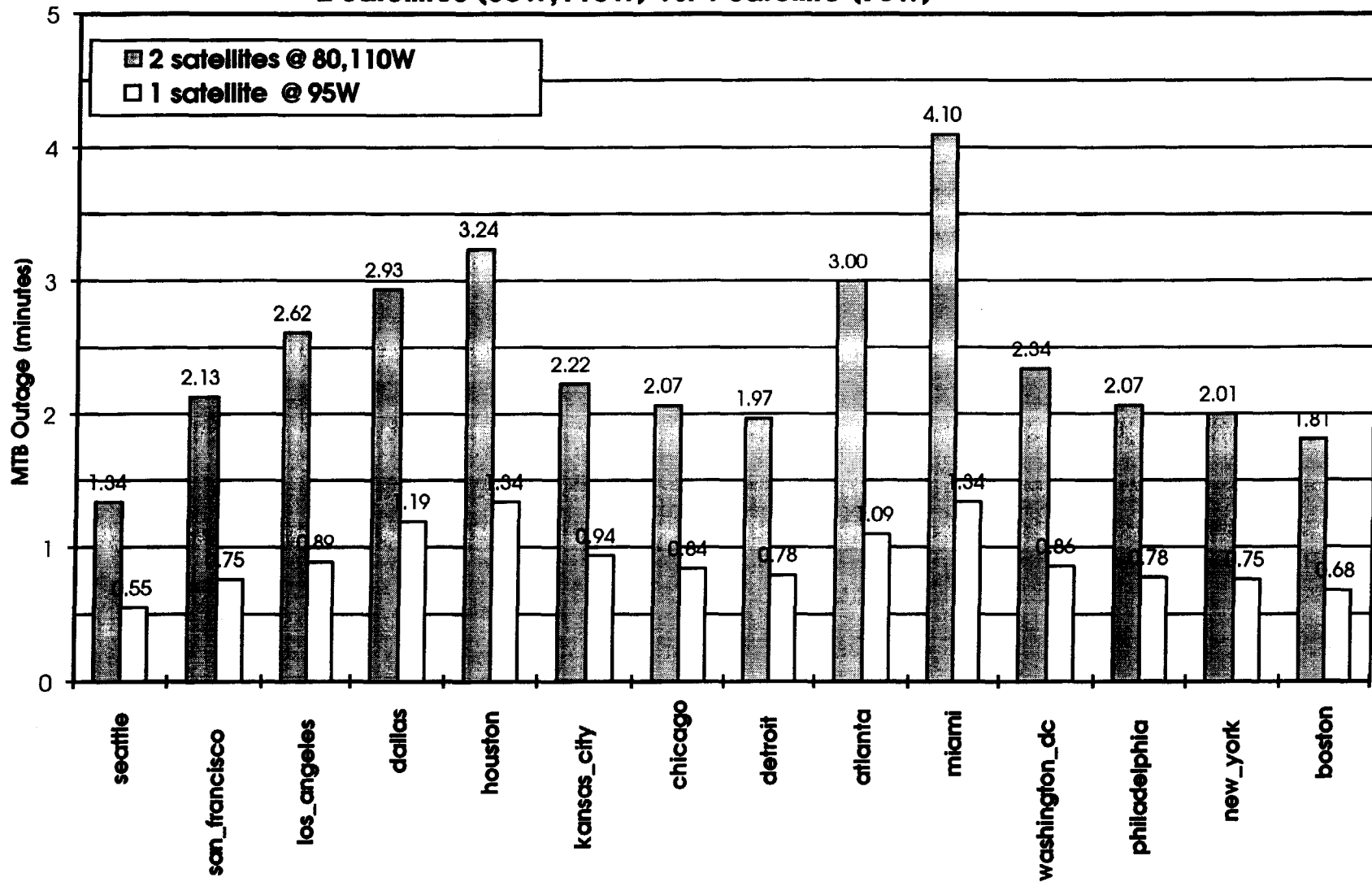
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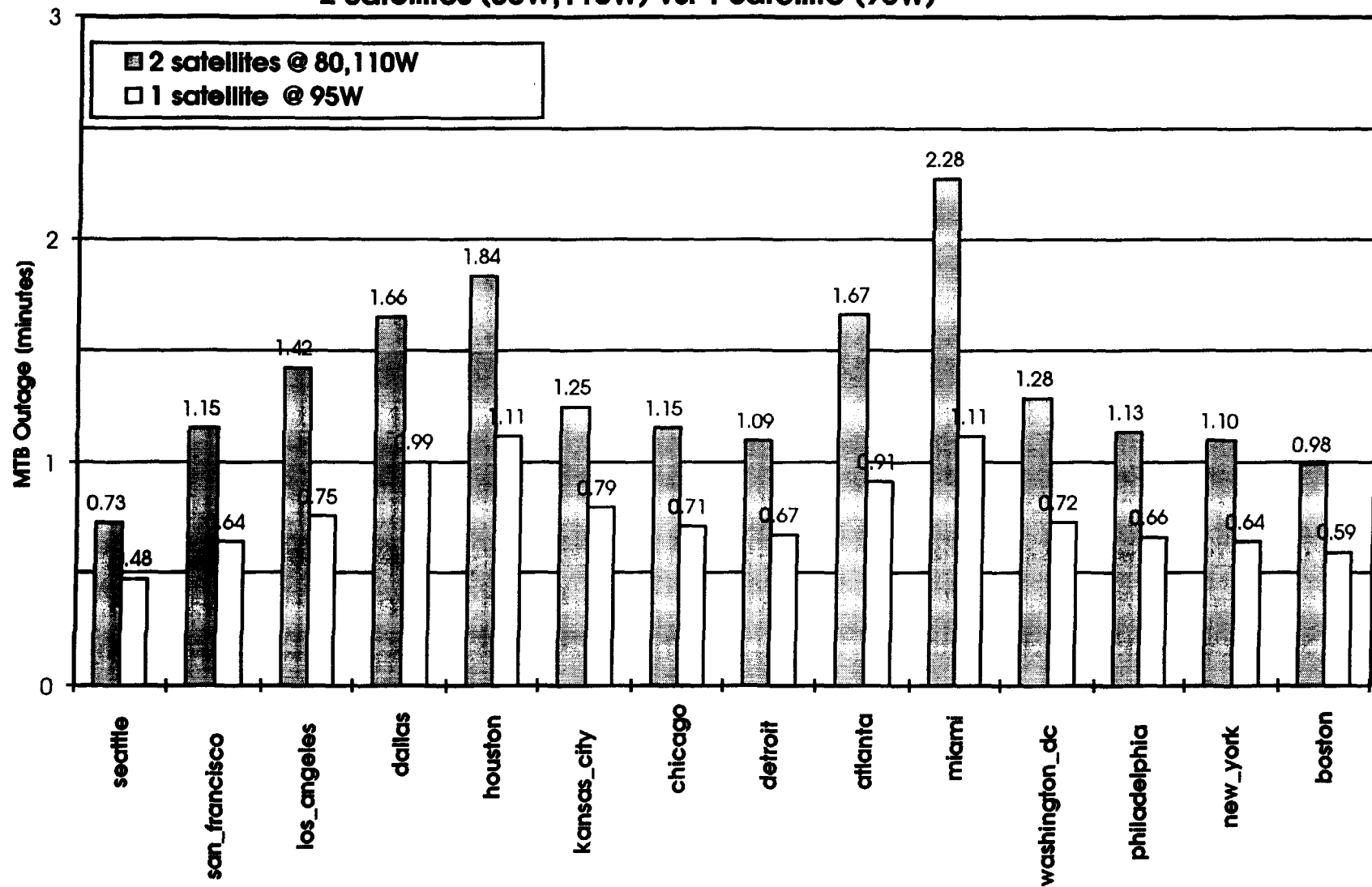
October 2, 1996

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Suburban Mean Time Between Outage (Minutes) **2 Satellites (80W,110W) vs. 1 Satellite (95W)**



Urban-outer Mean Time Between Outage (Minutes)
2 Satellites (80W,110W) vs. 1 Satellite (95W)



Technical Certificate

I hereby certify that I am the technically qualified person responsible for the preparation of the technical information contained in the Primosphere Limited Partnership Submission to Review Panel, to which this Technical Certificate is attached; that I am familiar with Part 25 of the FCC's rules; that I have prepared or reviewed the technical material in the filing; and that it is complete and accurate to the best of my knowledge.

By: Kenneth F. Manning
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Date: October 2, 1996